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DRY CLEANING DETERGENT COMPOSITION

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Abstract

Objective

For a dry cleaning detergent composition containing a quaternary ammonium salt or other cationic surfactants, storage stability is improved without using a coupling agent or an organic solvent called a mutual solvent or the like, and detergency and recontamination-preventing effect are also improved.

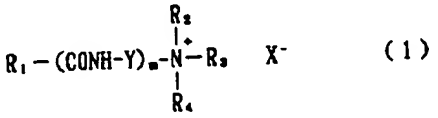
Means to solve

A dry cleaning detergent composition containing (a) stearyldimethylhydroxy ethylammonium methyl sulfate or other quaternary ammonium salt, and (b) a C_{8-22} linear or branched, saturated or unsaturated fatty acid, at a specific weight ratio.

Claims

1. A dry cleaning detergent composition, characterized by the fact that it contains (a) at least one of the quaternary ammonium salts represented by the following general formula,

[Structure 1]



(1)

(where R_1 is a C_{8-22} alkyl group, r_2 is a C_{1-22} alkyl group, a hydroxyethyl group or a hydroxypropyl group, R_3 and R_4 are C_{1-3} alkyl groups, hydroxethyl groups or hydroxypropyl groups, and at least one of R_3 and R_4 is a hydroxyethyl group or a hydroxypropyl group; furthermore, Y is an ethylene or propylene group, m represents a number of 0 or 1; moreover, X^- represents an anionic group of nitric acid, sulfuric acid, phosphoric acid, ptoluenesulfonic acid, methyl sulfate, ethyl sulfate, or glycolic acid) and (b) a C_{8-22} linear or branched, saturated or unsaturated fatty acid, and the weight ratio of components (a) and (b), or (a)/(b) = 5/1 to 1/10.

2. The dry cleaning detergent composition described in Claim 1, in which the total content of the two components (a) and (b) is 10-70 wt%.

Detailed explanation of the invention

[0001]

Industrial application field

The present invention relates to a dry cleaning detergent composition. More specifically, it relates to a dry cleaning detergent composition having an excellent detergency and a recontamination-preventing effective and which is highly economical and safe.

[0002]

Prior art

Dry cleaning is a method for washing fiber products and the like by using an organic solvent instead of water as a washing medium. As the organic solvents (dry cleaning solvents), tetrachloroethylene, trichloroethylene, trichloroethane, trichlorotrifluoroethane or other halogenated hydrocarbon solvents, or paraffin, cycloparaffin, aromatic hydrocarbons or other petroleum solvents and so on can be used. In general, dry cleaning detergent compositions obtained by blending a variety of active agents for the removal of water-soluble dirts and solid dirts in these solvents are used in combination in dry cleaning. Such a dry cleaning detergent composition is generally a liquid detergent composition obtained by blending a surfactant (blended at 5-80 wt%-to be denoted as % hereafter-of the composition for convenience in usage), a solvent, a viscosity-reducing agent, a corrosion inhibitor, etc. During usage, this liquid detergent composition is diluted for use to a content of 0.1-5 % with respect to the dry cleaning solvent (often the same solvent as the one in said composition) described previously.

[0003]

At present, in response to demand to shorten and streamline the dry cleaning washing step, a washing method in which a single detergent is used to perform softening treatment and electrostatic prevention processing at the same time as the clothes are being washed has become popular. As the related finishing agent, a cationic surfactant has been used.

[0004]

Problems to be solved by the invention

In the dry cleaning detergent composition using a cationic surfactant, as solvents to enhance the solubilization of cationic surfactants called coupling agents, mutual solvents or the like, methanol, ethanol, isopropanol, n-butanol, butyl Cellosolve, cyclohexanol, and so on are used in combination with the dry cleaning solvents.

[0005]

However, it is known that these solvents, blended as coupling agents or mutual solvents, shorten the life of activated carbon as a deodorizing agent or the like in the tumbler drying process and the deodorizing process after the washing of clothes. Furthermore, by using these solvents in the dry cleaning detergent composition, especially by using petroleum type solvents in dry cleaning solvents, flash points are decreased. In the solvent evaporation purification and tumbler drying processes, the hazard of explosions due to inflammability and other disasters exists. Therefore it is desirable to make an improvement from aspects of not only economy but also safety.

[0006]

Means to solve the problems

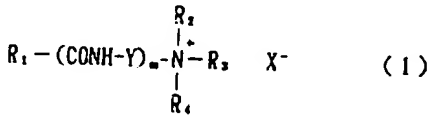
As a result of zealous investigations, the present inventors have discovered that, by mixing a cationic surfactant and a fatty acid at a specific ratio for use, without using organic solvents called coupling agents or mutual solvents, we were successful in the stable blending of a cationic surfactant and achieved a good detergency and a recontamination-preventing effect. The present invention has been accomplished.

[0007]

In other words, the present invention provides a dry cleaning detergent composition characterized by the fact that it contains (a) at least one of quaternary ammonium salts represented by the following general formula,

[0008]

[Structure 2]



(1)

[0009]
(where R_1 is a C_{8-22} alkyl group, R_2 is a C_{1-22} alkyl group, a hydroxyethyl group or a hydroxypropyl group, R_3 and R_4 are C_{1-3} alkyl groups, hydroxyethyl groups, or hydroxypropyl groups, and at least one of R_3 and R_4 is a hydroxyethyl group or a hydroxypropyl group. Furthermore, Y is an ethylene or propylene group, m represents a number of 0 or 1. Moreover, X^- represents an anionic group of nitric acid, sulfuric acid, phosphoric acid, p-toluenesulfonic acid, methyl sulfate, ethyl sulfate, or glycolic acid) and (b) a C_{8-22} linear or branched, saturated or unsaturated fatty acid, and the weight ratio of components (a) and (b), or (a)/(b) = 5/1 to 1/10.

[0010]
Those with R_1 of less than 8 and more than 22 carbon atoms in the quaternary ammonium salts represented by the general formula (1) for use in the present invention do not have a good performance. As the preferred quaternary ammonium salts, stearyldimethylhydroxyethylammonium ethyl sulfate, stearyldimethylhydroxyethylammonium phosphate, stearyldimethylhydroxyethylammonium p-toluenesulfonate, stearyldimethylhydroxyethylammonium methyl sulfate, stearyldimethylhydroxyethylammonium ethyl sulfate, stearoylaminoethyldimethylhydroxyethylammonium methyl sulfate, stearoylaminoethyldimethylhydroxyethylammonium glyconate, lauryldimethylethyl ammonium stearate, dilaurylhydroxyethylammonium nitrate, stearyldimethylhydroxyethyl propylammonium ethyl sulfate, stearyldimethylhydroxypropylammonium ethyl sulfate, coconut or beef tallow aminoethyldimethylhydroxyethylammonium ethyl sulfate and so on can be mentioned.

[0011]
As the fatty acids that can be used in the present invention, C_{8-22} linear or branched, saturated or unsaturated fatty acids are preferred. Fatty acids with less than 8 carbon atoms are not preferred since they have a strong unique malodor of fatty acids. Furthermore, for those with more than 22 carbon atoms, they are not preferred since the solubilizing capability of the fatty acids is decreased. As specific examples of the preferred fatty acids, caproic acid, caprylic acid, lauric acid, myristic acid, stearic acid, oleic acid, linolic acid, isostearic acid and so on can be mentioned. Among these, C_{12-18} fatty acids are especially preferred.

[0012]
The weight ratio of the two components (a) and (b) is in the range of (a)/(b) = 5/1 to 1/10, more preferably in the range of (a)/(b) = 2/1 to 1/5. If the weight ratio of components (a) and (b) is outside the range mentioned previously, detergency and recontamination-preventing power with respect to oils and fats will decrease, or the solubilizing capability of the cationic surfactant

will decrease, and the stability as a dry cleaning detergent composition will be damaged. Moreover, the total content of the two components (a) and (b) is 10-70 wt%, more preferably 10-50 wt%.

[0013]

In the dry cleaning detergent composition of the present invention, in addition to the necessary components mentioned previously, sulfosuccinic acid esters and other anionic surfactants, fatty acid monoethanolamides, fatty acid diethanolamides, polyoxyethylene alkyl phenyl ethers (such as polyoxyethylene nonyl phenyl ether, etc.) and so other nonionic surfactants, and dry cleaning solvents as balancing agents are used. There are no special restrictions on the dry cleaning solvents to be used. The following ones are mentioned as typical examples. Tetrachloroethylene, trichloroethylene, trichloroethane, trichlorotrifluoroethane, paraffins (boiling points 120-220°C), and the so-called petroleum solvents containing cycloparaffin and/or aromatic hydrocarbons can be mentioned.

[0014]

It is preferable that the dry cleaning detergent composition of the present invention be used after dilution with a dry cleaning solvent so that it is 0.02-4 wt% during usage. More preferably, it is used at 0.3-2.0 wt.%.

[0015]

Effect of the invention

The dry cleaning detergent composition of the present invention is a material constituted in the manner described previously. It has excellent detergency and recontamination-preventing power even with respect to skin oils. Furthermore, it has a low viscosity and is excellent in storage stability.

[0016]

Implementation embodiment of the invention

The present invention will be explained in detail by giving application examples in the following. However, the present invention is not to be restricted to these application examples.

[0017]

Application Examples 1-10, and Comparative Examples 1-4

The compositions shown in Tables 1-3 were prepared. The evaluations of detergency for artificially contaminated cloth, recontamination-preventing power, and storage stability were investigated according to the following methods. The results are shown in Tables 1-3.

[0018]

① Washing test method

Artificially contaminated cloth and a white cloth (wool, cotton) for recontamination evaluation were placed in 100 mL tetrachloroethylene containing 0.5 vol% of a dry cleaning detergent composition. Washing was carried out at 20°C for 10 min in a scrubometer [transliteration] (manufactured by Toyo Seiki).

② Oil composition of the artificially contaminated cloth and methods for the evaluations of detergency and recontamination-preventing power

< Oil composition of the artificially contaminated cloth >

Cottonseed oil	60%
Cholesterol	10%
Oleic acid	10%
Palmitic acid	10%
Solid and liquid paraffin	10%

In the evaluation of detergency and recontamination-preventing power, reflectivities of the original cloth before contamination (by mixing carbon black as an indicator by the regular method) and the contaminated cloth after washing were measured (at 550 μm) with an autorecording colorimeter (manufactured by Shimazu Mfg. Co.). The detergency ratio (%) and the recontamination ratio (%) were calculated by the following equations.

[0019]

[Mathematical formula 1]

$$\text{Detergency (\%)} = \frac{R(w) - R(s)}{R(o) - R(s)} \times 100$$

[0020]

[Mathematical formula 2]

$$\text{Recontamination ratio (\%)} = \frac{R(o) - R(s)}{R(o)} \times 100$$

[0021]

R (o): Reflectivity of original cloth

R (s): Reflectivity before washing

R (w): Reflectivity after washing

[0022]

③ Storage stability test method

In the storage stability test, a storage test was carried out on a dry cleaning detergent composition under constant temperature conditions of-5°C and 40°C for 30 days. The states of the dry cleaning detergent composition after storage were observed with the naked eye. It was scored with the 5 points as a full mark.

5 points	No change from that before storage
4 points	Color phase changed slightly
3 points	Slight turbidity was formed
2 points	Precipitate was found
1 point	Solidified or frozen

[0023]

Table 1

		(1)実施例				
		1	2	3	4	5
(2)組成(重量%)(5)	ステアリルジメチルヒドロキシエチルアンモニウムメチルサルフェート(3)	20	15	10	25	5
	オレイン酸(4)	10	15	20	5	25
	ラウリン酸ジエタノールアミド	10	10	10	10	10
	テトラクロロエチレン(6)	60	60	60	60	60
洗浄率(%)(7)	ウール(8)	69	67	68	65	66
	綿(9)	54	50	54	53	53
再汚染率(10)(%)	ウール(8)	11	12	9	9	12
	綿(9)	14	12	11	11	12
(11)保存安定性	−5℃	5	5	5	5	5
	40℃	5	5	5	5	5

Key:
1 Application Example
2 Composition (wt%)
3 Stearyldimethylhydroxyethylammonium methyl sulfate
4 Oleic acid
5 Lauric acid diethanolamide
6 Tetrachloroethylene
7 Detergency (%)
8 Wool
9 Cotton
10 Recontamination ratio
11 Storage stability

[0024]

Table 2

		比較例(1)			
		1	2	3	4
(2) 組成 (重量%)	ステアリルジメチルヒドロキシエチルアンモニウムメチルサルフェート(3)	35	1	40	0
	オレイン酸(4)	5	29	0	40
	ラウリン酸ジエタノールアミド(5)	10	10	10	10
	テトラクロロエチレン(6)	50	60	50	50
洗浄率(%)(7)	ウール(8)	55	36	19	20
	綿(9)	48	29	14	11
再汚染率(%)(10)	ウール(8)	19	10	12	14
	綿(9)	15	11	11	17
保存安定性(11)	−5℃	1	4	1	2
	40℃	3	3	4	4

Key:
1 Comparative Example
2 Composition (wt%)
3 Stearyldimethylhydroxyethylammonium methyl sulfate
4 Oleic acid
5 Lauric acid diethanolamide
6 Tetrachloroethylene
7 Detergency (%)
8 Wool
9 Cotton
10 Recontamination ratio
11 Storage stability

[0025]

Table 3

		実施例(1)				
		6	7	8	9	10
(2) 組成 (重量%)	ラウリルジメチルエチルアンモニウムメチルサルフェート (3)	20	20	20		
	ステアロイルアミノエチルジメチルヒドロキシエチルアンモニウムグリコネート (4)				20	
	ヤシ油ジメチルヒドロキシエチルアンモニウムエチルサルフェート (5)					20
	カプリル酸 (6)	10			10	10
	ラウリン酸 (7)		10			
	イソステアリン酸 (8)			10		
	(9) ラウリン酸ジエタノールアミド	10	10	10	10	10
	(10) スルホコハク酸ジヘキシルエステル	10	10	10	10	10
	(11) テトラクロロエチレン	50	50	50	50	50
洗浄率 (%) (12)	ウール (13)	61	58	59	60	57
	綿 (14)	53	51	50	52	51
再汚染率 (15) (%)	ウール (13)	8	10	8	11	9
	綿 (14)	12	11	12	13	10
保存安定性 (16)	−5℃	5	5	5	5	5
	40℃	5	5	5	5	5

Key:
1 Application Example
2 Composition (wt%)
3 Lauryldimethylethylammonium methyl sulfate
4 Stearoylaminoethyldimethylhydroxyethylammonium glyconate
5 Coconut oil dimethylhydroxyethylammonium ethyl sulfate
6 Caprylic acid
7 Lauric acid
8 Isostearic acid
9 Lauric acid diethanolamide
10 Sulfosuccinic acid dihexyl ester
11 Tetrachloroethylene
12 Detergency (%)
13 Wool
14 Cotton
15 Recontamination ratio
16 Storage stability